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CONTENTS

PAGE

EYLES, A. C. Variation in the adult and immature stages of *Nysius huttoni* White (HETEROPTERA : LYGAEIDAE) with a note on the validity of the genus *Brachynysius* Usinger . . . . . 53–72, 14 figs.

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VARIATION IN THE ADULT AND IMMATURE STAGES OF *NYSIUS HUTTONI* WHITE (HETEROPTERA : LYGAEIDAE) WITH A NOTE ON THE VALIDITY OF THE GENUS *BRACHYNYSIUS* USINGER

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With 14 Text-figures

Contents

	PAGE
I. Introduction	53
II. Descriptions of stadia	54
(1) Imago	54
(2) Egg	57
(3) Nymphal instars	57
III. Variation within the species	64
(1) Immature stages	64
(*a*) Egg dimensions	64
(*b*) Progression in growth	65
(2) Adults	67
(*a*) Effect of temperature on wing form	67
(*b*) Crossing of forms	68
(*c*) Variation in size	69
IV. Validity of *Brachynysius*	71
V. Summary	71
VI. Acknowledgments	71
VII. References	72

I. Introduction

Nysius huttoni White, endemic to New Zealand, is the only species of *Nysius* recorded from that country. It was described by Buchanan White (1878) from adult specimens collected by Hutton and Wakefield. Hutton (1897) gave a brief description of the species in a list of Hemiptera then known in New Zealand. A key to the New Zealand Lygaeid genera and species is included in his paper. Myers (1926), unable to identify four species of *Nysius* other than *N. huttoni*, sent specimens to Dr. Bergroth for description, but the outcome does not appear in the literature. Usinger (1943), on examining eleven specimens of *N. huttoni*, noted such variability " in colour and even to some extent in structure that two species may be represented ". Usinger's paper comprises a history of the tribe Orsillini in New Zealand, and descriptions of five new species, including *Brachynysius convexus* Usinger, which genus he here also erected.

Evidence that *N. huttoni* occurs throughout the North and South Islands of New Zealand was given by Myers (1926), Usinger (1943), Gurr (1957) and Cumber (1959).

Alfken (1903) and Kirkaldy (1908) have both recorded it from the Chatham Islands, whilst Woodward (1954) recorded it from the Three Kings Islands.

II. Descriptions of Stadia

Definitions of terms used.—The terminology follows that of Usinger (1942), except that head length and anteocular length were measured from directly above the insect when the latter was in a horizontal position. In addition, the following were measured; *legs*, each segment measured individually; *total length of forewing* and, where possible, *total length of hindwing*; and *length of hindwing exceeding posterior of abdomen*. Adult measurements are given in micrometer units: one micrometer unit = 0·24 mm.

(1) *Imago*

Redescription (based on group I, larger individuals; figures 1 *A* and *B*, 2 *A* and *B*, and Table I).

Head: approximately two-thirds broader than long, 3·6 : 2·2; extending well beyond middle of first antennal segment; covered by a fine pubescence; eyes less than half as wide as interocular space, 0·8 : 2·0; length of eye equal to anteocular length, 1·0 : 1·0. Bucculae scarcely decreasing in height posteriorly and suddenly ending before posterior margin of head. Rostrum extending to posterior coxae, and resting in a groove on underside of head, and partially in a shallow groove on ventral surface of thorax; first segment shorter than head, 2·0 : 2·2; segments one to four 2·0 : 1·9 : 1·7 : 1·4. Antennae a little longer than twice width of head, 7·3 : 3·6; as long as head, pronotum and scutellum together, 7·3 : 7·3; segments one to four 1·2 : 2·3 : 1·7 : 2·1.

Thorax: pronotum almost one-third longer than head, 2·9 : 2·2; approximately as broad anteriorly as long, 3·1 : 2·9; two-thirds broader posteriorly than long, 4·9 : 2·9; sides straight; posterior edge slightly convex; punctate, but sometimes only in paler, posterior portion. Scutellum broader than long, 3·2 : 2·2; with a triradiate elevation in the centre; sometimes very sparsely punctate. Pronotum and scutellum covered by coarse hairs, but, in the female, only by a fine pubescence.

Hemelytra: scarcely to slightly convex; exceeding tip of abdomen by one-fourth length of membrane, 1·5 : 6·2; membrane one-seventh shorter than costal margin of corium, 6·2 : 7·2; the portion of membrane posterior to level of apices of coria approximately as long as the portion anterior to this, 3·2 : 3·0; costal margins straight but diverging almost to apex of scutellum and then arcuate. Three black blotches more or less confluent along suture between corium and membrane; embolium distinct, 0·12 mm. at greatest width; clavus and corium covered by a fine pubescence; membrane veined and opaque, but sometimes clear. Hind wings slightly shorter than fore wings, 9·6 : 10·6; usually extending a little beyond posterior of abdomen.

Legs: femora spotted, fore femora shorter than mid femora, mid femora shorter than hind femora, 3·0 : 3·5 : 4·6; fore tibiae shorter than mid tibiae, mid tibiae shorter than hind tibiae, 2·8 : 3·0 : 4·8; second tarsal segment shortest, 0·5; first and third tarsal segments of equal length on fore and mid legs, 0·8; but first segment longer than third on hind tarsus, 1·3 : 0·9.

Female: larger in general, and in particular broader across hemelytra; ovipositor cleft more than half length of abdomen.

Size (in mm.).—*Male:* mean length 3·74; mean width (head) 0·86; (hemelytra) 1·37. *Female:* mean length 4·00; mean width (head) 0·94; (hemelytra) 1·67.

Colour.—Head: black (Ostwald series II, 2 *pn*)[1] sometimes completely, but usually mid-dorsal surface lighter in colour to reddish-brown (varying in extent); eyes reddish-brown (O. IV, 5 *pl*); antennae yellowish-brown (O. VIII, 4 *lc*) on first and second segments, third and fourth segments dark brown (O. IV, 4 *pl*); rostrum black (O. II, 2 *pn*). *Pronotum:* with a densely black (O. series O, *p*) transverse band one-third total length from anterior margin; usually black (O. II, 2 *pn*) in anterior half and mainly pale buff or dull straw yellow (O. IV, 2 *gc*) in posterior half, but sometimes completely black. Scutellum black (O. II, 2 *pn*). *Hemelytra:* usually pale buff or dull straw yellow (O. IV, 2 *gc*) but sometimes variegated with black; membrane varies from pale buff to cloudy white to almost clear; three black blotches along each corial suture. *Legs:* also pale buff, femora spotted black, third tarsal segment dark brown (O. IV, 4 *pl*).

[1] Throughout the descriptions, Ostwald's *Colour Standards* (as arranged by Taylor, 1931) are referred to, and each reference is abbreviated on the pattern (O.II, 2 *pn*).

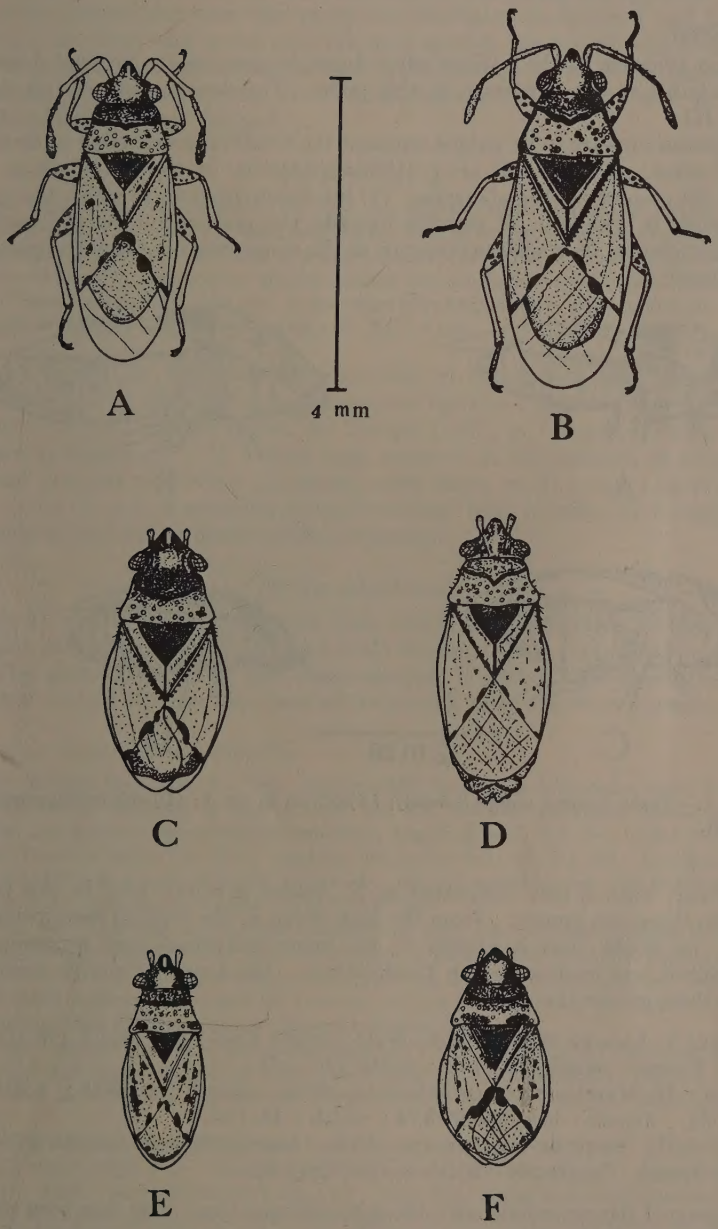


FIG. 1.—*Nysius huttoni*, adults (dorsal): (*A*) macropterous male, group I; (*B*) macropterous female, group I; (*C*) sub-brachypterous female, group II; (*D*) brachypterous female, group II; (*E*) sub-brachypterous male, group III; (*F*) sub-brachypterous female, group III.

Plesiotype, male (selected from a series collected by L. Gurr, Nelson, January 1950), lodged at Massey Agricultural College, New Zealand.

Other Forms

As no evidence of the various adult forms is given in the original description, it is desirable to mention them at this point. Variation is discussed in detail in Section III.

N. huttoni appears to be unique amongst the Orsillini in occurring in three forms in both sexes. These forms are: (1) macropterous, in which the wings extend beyond the posterior of the abdomen; (2) sub-brachypterous, in which the posterior of the wings is level with, or scarcely exceeds, the posterior of the abdomen; and (3) brachypterous, in which the posterior of the wings does not reach the posterior of the abdomen.

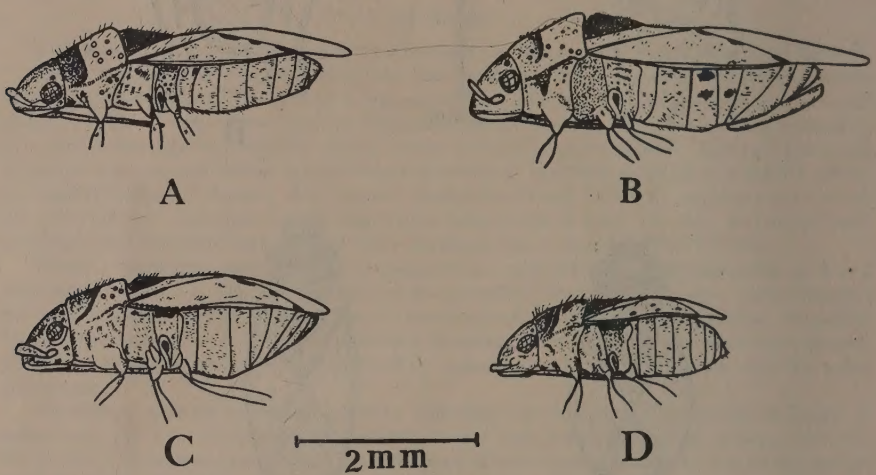


FIG. 2.—*Nysius huttoni*, adults (lateral); (*A*)–(*C*) as in fig. 1; (*D*) sub-brachypterous male, group III.

Further, what is now designated as *N. huttoni* is shown later in this paper to comprise three size groups. From the sizes given in the original description, there can be no doubt that it applies to the larger individuals, and accordingly, the redescription was made on group I individuals. The ranges of size (in millimetres) for the three groups are :—

GROUP I. LARGER INDIVIDUALS—*Male*: length 3·55–3·86; width 1·32–1·39. *Female*: length 3·74–4·34; width 1·61–1·75.

GROUP II. MEDIUM SIZED INDIVIDUALS—*Male*: length 3·00–3·48; width 1·15–1·32. *Female*: length 3·36–3·74; width 1·44–1·53.

GROUP III. SMALLER INDIVIDUALS—*Male*: length 2·38–3·00; width 0·94–1·15. *Female*: length 2·47–3·19; width 1·20–1·32.

In group I (larger individuals), the macropterous form, only, has been observed. In both group II (medium sized individuals) and group III (smaller individuals) the three forms, macropterous, sub-brachypterous and brachypterous occur. Thus there are seven differing "kinds" of individuals within the species (depending on size and wing-form). There is also considerable colour variation.

The sub-brachypterous forms are characterized by distinctly convex hemelytra, reaching or slightly exceeding the posterior of the abdomen. The membrane is

shortened, exceeding level of apices of coria by less than one-fourth the total length of the membrane. The veins on the membrane are sometimes not apparent.

Representatives from each size group are illustrated in figures 1 and 2, which also depict the three wing-forms over the total species, but not all wing-forms from each size group. Sub-brachypterous and brachypterous forms of *N. huttoni* have been lodged, by the author, at the British Museum (Nat. Hist.) and at Massey Agricultural College, New Zealand.

(2) *Egg* (Fig. 3)

Longer than broad, ratio length to width, 3 : 1 ; slightly concave ventrally, convex dorsally and laterally ; blunt anteriorly, pointed posteriorly. Four to six papilliform micropylar processes surround cephalic pole ; no operculum or pseudoperculum ; external chorionic surface sculptured in anterior third with longitudinal grooves, almost converging at cephalic pole. *Size :* mean length 0·77 mm.; mean width 0·28 mm. *Colour* (soon after oviposition) : straw yellow (O. X, 2 *la*), darker area at cephalic pole marigold orange (O. XIV, 4 *pa*).

During incubation, the grooves or wrinkles in the chorion may extend. The colour of the freshly laid egg has been described by Gurr (1957) as " creamy white " and that of *Nysius coenosulus* Stål by Usinger (1942) as " almost water white or colourless and shining. " *N. huttoni* eggs observed at the moment of oviposition were very pale and were either (*a*) almost water white, or (*b*) a very pale yellowish-orange. The (*b*) type of colouring probably resulted from retention of the egg within the abdomen for a longer period before oviposition.

(3) *Nymphal instars*

Table II shows the measurements from which the descriptions are taken. All nymphal measurements are in eyepiece scale divisions : one scale division = 0·063 mm. The means are from 11 first stage nymphs, 17 fifth stage nymphs (including both sexes) and 10 nymphs from each of the second, third and fourth instars.

First nymphal instar (fig. 3 and Table II)

Head : broader than long, 4·5 : 3·4 ; eyes one-fifth as wide as interocular space, 0·64 : 3·2, and approximately one-third as long as head, 1·0 : 3·4. Rostrum extending beyond posterior coxae, the first segment approximately two-thirds length of head, 2·0 : 3·4 ; total length over two-thirds length of body, 7·4 : 10·4 ; segments one to four 2·0 : 1·9 : 1·4 : 2·1. Antennae almost one and a half times as long as width of head, 6·4 : 4·5 and approximately two-thirds length of body, 6·4 : 10·4 ; segments one to four 1·0 : 1·0 : 1·6 : 2·8.

Thorax : pronotum almost five times broader than long, 4·5 : 1·0, slightly longer than mesonotum. Mesonotum slightly longer than metanotum. A narrow strip extending slightly on both sides of midline on pronotum, and more so on mesonotum, lacks black pigmentation. Metanotum devoid of black pigmentation except for a narrow, oblique line extending full length of segment on each side. Pleura of thorax narrow, flattened, transparent.

Abdomen : shorter than head and thorax together, 4 : 6 ; slightly wider than head, 5·4 : 4·5. Two distinct mid-dorsal abdominal scent gland openings intersegmentally disposed between segments four and five, and five and six. Pleura narrow, flattened, opaque. Eight abdominal segments.

Tarsi : two-segmented, distal segment longer than proximal, 1·8 : 0·7 (hind tarsus).

Size (in mm.) (when fed) : mean length 0·84 ; mean width (head) 0·28 ; (abdomen) 0·34.

Colour[2]*: Head :* brownish-black (O. IV, 4 *pl*) ; seven head stripes and ecdysial suture of head, orange (O. XII, 3 *pc*) giving impression of portions not darkened ; eyes red (O. XIV, 7 *pa*) ; antennae and rostrum grey-black (O. II, 1 *li*) ; distal rostral segment black (O. series O, *n*). *Thorax :* pro- and mesonota brownish-black (O. IV, 4 *pl*), the undarkened, mid-dorsal strip, orange (O. XII, 5 *na*). Metanotum basically orange as abdomen ; two narrow, oblique, lateral, black markings extend length of segment. Pleura undarkened, as abdomen. Ventral thorax :

[2] At eclosion, the nymph is pale orange in colour, but darkening occurs gradually over a period of seven hours until definitive coloration (as described above) is assumed.

TABLE I.—*Body Measurem*

(All measurements are in micrometer units : one micrometer unit = 0·24

	Head length	Head width	Inter-ocular width	Eye width	Ante-ocular length	Eye length	Rostral segments 1	2	3	
Males										
Mean .	2·2	3·6	2·0	0·8	1·0	1·0	2·0	1·9	1·7	1·
Range .	2·0–2·4	3·5–3·8	1·9–2·0	0·8–0·9	1·0–1·1	1·0–1·1	1·9–2·1	1·8–2·0	1·5–1·8	1·
S.D. .	0·18	0·12	0·05	0·05	0·07	0·07	0·07	0·10	0·14	0·
Females										
Mean .	2·2	3·9	2·4	0·8	1·2	1·1	2·1	1·7	1·5	1·
Range .	2·0–2·5	3·8–4·0	2·3–2·4	0·8	1·0–1·3	1·0–1·1	2·0–2·2	1·5–2·0	1·4–1·7	1·
S.D. .	0·21	0·11	0·07	0	0·07	0·07	0·01	0·20	0·13	0·

	Hemelytra: Length of membrane: Total	Beyond apices of coria	Beyond abdomen	Length of corium	Total wing length	Hindwings: Total wing length	Length beyond abdomen	Femora: Fore	Mid	
Males										
Mean .	6·2	3·2	1·5	7·2	10·6	9·6	0·4	3·0	3·5	4·
Range .	5·8–6·6	2·5–3.7	0·8–1·9	6·8–7·8	9·9–11·0	9·4–9·7	0·3–0·4	2·8–3·1	3·2–3·6	4·
S.D. .	0·31	0·50	0·38	0·41	0·46	0·31	0·31	0·11	0·16	0·
Females										
Mean .	6·9	3·6	1·7	8·3	11·5	10·3	1·0	3·2	3·5	5·
Range .	6·5–7·8	3·0–4·2	1·4–1·9	7·9–9·0	10·2–12·8	9·7–10·8	0·7–1·3	3·0–3·5	3·2–3·7	4·
S.D. .	0·50	0·49	0·20	0·41	1·05	0·55	0·44	0·21	0·19	0·

subcoxal plates, only, darkened ; rest orange. Legs lighter than head, grey-black (O. II, 1 *li*). *Abdomen :* basically orange (O. XII, 5 *na*) ; abdominal scent gland openings dark ; three red (O. XIV, 6 *pa*) spots occur on dorsum, two laterally, and one towards anus ; anus black (O. series O, *n*).

Second nymphal instar (fig. 3 and Table II)

Head : broader than long, 6·4 : 5·0 ; eyes approximately one-fourth as wide as interocular space, 1·0 : 4·4, and approximately one-third as long as head, 1·5 : 5·0. Rostrum extending beyond posterior coxae, the first segment one half length of head, 2·5 : 5·0 ; total length almost half length of body, 9·8 : 19·5 ; segments one to four 2·5 : 2·5 : 2·0 : 2·8. Antennae one and a third times as long as width of head, 8·4 : 6·4 ; less than half length of body, 8·4 : 19·5 ; segments one to four 1·6 : 1·7 : 1·8 : 3·3.

Thorax : pronotum slightly longer than mesonotum ; broader than long ; broader posteriorly than anteriorly ; sides straight or slightly arcuate, rounded posteriorly. Metanotum approximately same length as mesonotum ; black pigmentation slightly extended on first stage, two semi-lunar patches visible on each side, reaching to one half to two-thirds length of metanotum. Black pigmentation absent from narrow strip on midline of pro- and mesonota. Pleura of thorax narrow, flattened, transparent. Femora longer than tibiae, 4 : 3 ; tarsi two-jointed, possessing bi-lobed ampullae ; proximal segment shorter than distal, 1·0 : 1·9 (hind tarsus).

Abdomen : same length as head and thorax together, 10 : 10 ; one and a half times as wide as head, 9·8 : 6·4. Two distinct mid-dorsal scent gland openings intersegmentally disposed between segments four and five, and five and six. Pleura narrow, flattened, opaque. Eight abdominal segments.

Nysius huttoni *Adults*

measurements were taken on 5 males and 5 females)

Antennal segments			Pronotum			Scutellum			
				Width					
2	3	4	Length	An-terior	Pos-terior	Length	Width	Body length	Body width
2·3	1·7	2·1	2·9	3·1	4·9	2·2	3·2	15·6	5·7
2·0–2·5	1·6–2·0	1·8–2·3	2·6–3·0	3·1–3·2	4·8–5·0	2·0–2·5	3·0–3·4	14·8–16·1	5·5–5·8
0·19	0·17	0·24	0·17	0·10	0·10	0·20	0·19	0·50	0·12
2·3	1·8	2·2	3·1	3·6	5·7	.	.	16·7	6·9
2·0–2·6	1·7–1·8	2·2–2·3	3·0–3·4	3·3–3·9	5·4–5·9	.	.	15·6–18·1	6·7–7·3
0·22	0·07	0·07	0·20	0·25	0·20	.	.	0·90	0·24

Tibiae		Tarsi								
		Fore			Mid			Hind		
Mid	Hind	1	2	3	1	2	3	1	2	3
3·0	4·8	0·8	0·5	0·8	0·8	0·4	0·7	1·3	0·5	0·9
2·7–3·5	4·0–5·4	0·7–0·8	0·4–0·5	0·7–0·9	0·7–0·9	0·4–0·5	0·5–0·8	1·1–1·5	0·4–0·6	0·8–0·9
0·32	0·52	0·05	0·05	0·10	0·10	0·05	0·12	0·17	0·071	0·071
3·4	5·5	0·8	0·4	0·7	0·8	0·4	0·8	1·6	0·5	0·9
3·0–3·7	4·9–6·0	0·6–1·0	0·4–0·5	0·5–0·9	0·7–1·0	0·4–0·5	0·7–0·9	1·2–1·8	0·5–0·7	0·7–1·3
0·28	0·46	0·17	0·05	0·19	0·12	0·071	0·10	0·26	0·10	0·24

Size (in mm.): mean length 1·23; mean width (head) 0·40; (abdomen) 0·62.

Colour : anterior half of body similar to first stage except that black pigmentation on metanotum has extended. Pleura transparent to pale grey (O, IV, 1 *ea*), flattened. *Abdomen :* dorsal surface basically dirty orange (O. XIV, 3 *pa*), offset by markings of red and white; red spots arranged irregularly; scent gland openings black; pleura grey. Ventral surface lacks markings except for lateral red streaks, black edges of two segments anterior to anus, and portions of viscera showing through cuticle. Anus black (O. II, 2 *pm*).

Third nymphal instar (fig. 3 and Table II)

Head : almost one-third again as broad as long, 8·0 : 5·6; eyes a little more than one-fourth as wide as interocular space, 1·4 : 5·1, and a little longer than one-third length of head, 2·0 : 5·6. Rostrum reaching posterior coxae, the first segment approximately two-thirds length of head, 3·3 : 5·6; total length approximately half length of body, 11·8 : 23·0; segments one to four 3·3 : 3·0 : 2·3 : 3·2. Antennae longer than width of head, 10 : 8; not quite half length of body, 10 : 23; segments one to four 2·0 : 2·0 : 2·1 : 3·9.

Thorax : pronotum broader than long; broader posteriorly than anteriorly; strongly convex dorsally; sides straight, rounded anteriorly and posteriorly. Pronotum longer than mesonotum, mesonotum longer than metanotum, 3 : 2 : 1. A dark black line now present across centre of pronotum. Black pigmentation absent from narrow strip on midline of pro-and mesonota. First signs of wing pad development appear as slight, rounded, laterally disposed projections on posterior margins of meso- and metanota, but less obvious on metanotum. Black pigmentation on metanotum further extended than in second stage, now bicornuate and almost reaching posterior of segment. Pleura narrow, flattened, opaque.

TABLE II.—*Body Measureme*

(All measurements are in eyepiece scale division

	Head length	Head width	Inter-ocular width	Eye width	Ante-ocular length	Eye length	Rostral segments 1	2	3	4
First stage nymphs										
Mean .	3·4	4·5	3·2	0·64	.	1·0	2·0	1·9	1·4	2·1
Range	3·0–4·0	4·2–5·0	3·0–3·5	0·5–0·8	.	1·0	1·7–2·1	1·5–2·0	1·0–1·7	2·0–
S.D. .	0·42	0·18	0·21	0·10	.	0	0·13	0·16	0·20	0·20
Second stage nymphs										
Mean .	5·0	6·4	4·4	1·0	.	1·55	2·5	2·5	2·0	2·8
Range	4·0–5·9	6·0–6·6	4·0–4·6	1·0	.	1·2–1·9	2·4–2·7	2·0–2·6	1·8–2·0	2·5–
S.D. .	0·60	0·21	0·21	0	.	0·22	0·075	0·31	0·082	0·17
Third stage nymphs										
Mean .	5·6	8·0	5·1	1·4	.	2·0	3·3	3·0	2·3	3·2
Range	4·7–6·5	7·8–8·1	5·0–5·5	1·2–1·6	.	1·8–2·2	3·0–3·6	2·8–3·2	2·0–2·5	3·0–
S.D. .	0·59	0·11	0·21	0·16	.	0·11	0·25	0·12	0·24	0·25
Fourth stage nymphs										
Mean .	6·9	10·6	6·5	2·0	3·9	2·7	4·8	4·0	3·0	4·0
Range	6·0–8·5	10·0–11·3	6·0–7·0	2·0–2·2	3·5–5·0	2·5–3·0	4·0–5·0	3·5–4·4	3·0–3·3	3·5–
S.D. .	0·90	0·52	0·50	0·082	0·53	0·23	0·33	0·23	0·10	0·30
Fifth stage nymphs										
Mean .	8·3	12·4	7·9	2·2	4·5	3·1	6·0	5·3	4·1	4·7
Range	6·0–11·5	11·2–13·0	7·0–9·0	1·8–2·8	4·0–5·8	2·9–3·5	5·2–7·0	4·0–6·0	3·5–5·0	4·0–
S.D. .	1·76	0·65	0·60	0·33	0·62	0·197	0·40	0·51	0·38	0·38

Fifth stage—continued

	Mesonotum width	Metanotum length at middle	Pronotum Length	Pronotum Width (posterior)	Length of foreleg Femur	Tibia	Tarsus 1	Tar 2
Mean .	20·0	1·3	7·0	15·7	7·4	7·7	2·0	4·0
Range	14·6–24·0	1·0–1·8	6·0–8·0	13·5–19·0	6·0–8·0	7·0–8·4	1·8–2·5	3·8–
S.D. .	2·27	0·27	0·57	1·52	0·65	0·45	0·15	0·08

Abdomen : slightly shorter than head and thorax together, 10·8 : 12·1 ; one-third again as wide as head, 11·8 : 8·0. Dorsal abdominal scent gland openings, and pleura as in first stage. Eight abdominal segments.

Tarsi : proximal segment to distal segment, 1·5 : 2·5 (hind tarsus).

Size (in mm.): mean length 1·5; mean width (head) 0·5; (abdomen) 0·74.

Colour. Head : black (O. II, 2 *pn*) ; seven head stripes and ecdysial suture of head, orange (O. XII, 3 *pc*) ; eyes dark red ; antennae, rostrum and underside of head, lighter than dorsal surface of head, brownish-black (O. IV, 2 *pl*). *Thorax* : pro-and mesonota and pigmentation on metanotum, black (O. II, 2 *pn*) ; a dense black line across centre of pronotum ; undarkened mid-dorsal strip, orange (O. XII, 3 *pc*) ; remainder of metanotum as abdomen ; pleura pale grey (O. IV, 1 *ea*) ; coxae and subcoxal plates black (O. II, 2 *pn*) ; remainder of ventral thorax, pale orange to grey (O. II, 1 *ge*) ; legs brownish-black, (O. IV, 2 *pl*). *Abdomen :* white spots surrounded by red (O. XII, 7 *pc*) spots, extending almost length of segment, are regularly arranged in a row across each segment. Background colour, still orange, is paler than these markings. Dorsal pleura marked by one red (O. XII, 7 *pc*) bar along centre of each segment, whilst two parallel red bars occur ventrally on each segment. Dorsal scent gland openings black ; two light

Nysius huttoni *Nymphs*

ıe scale division = 0·063 mm.)

Antennal segments				Body length		Abdomen width		Length of mesonotum	
1	2	3	4	Unfed	Fed	Unfed	Fed	At middle	To tip of wing pad
)	1·0	1·6	2·8	10·4	13·4	5·0	5·4	.	.
)	1·0–1·1	1·5–1·7	2·5–3·0	9·5 –	14·5	4·0 –	6·0	.	.
	0·045	0·071	0·16	0·66	0·82	0	0·82	.	.
					Fed		Fed		
5	1·7	1·8	3·3		19·5		9·8	.	.
4–1·8	1·6–1·8	1·7–1·9	3·0–3·7		18–22		9–11	.	.
14	0·094	0·057	0·25		1·44		0·86	.	.
)	2·0	2·1	3·9		23·0		11·8	.	.
8–2·0	1·8–2·5	2·0–2·5	3·4–4·1		18–25		10–14	.	.
067	0·19	0·18	0·21		2·55		1·51	.	.
7	3·5	3·0	5·3		32·5		17·4	3·8	6·0
4–3·0	3·0–4·0	2·5–3·6	5·0–5·9		28–38		15–20·5	3·0–4·5	5·0–7·2
22	0·41	0·31	0·33		3·00		1·62	0·51	0·75
3	5·1	4·0	6·5		40		19·7	6·5	13·3
)–4·0	4·5–6·0	3·5–4·5	6·0–7·7		36–47		15–27	5·1–8·0	11·7–16·0
32	0·46	0·26	0·45		2·95		2·74	0·75	1·01

Length of midleg				Length of hindleg			
mur	Tibia	Tarsus 1	Tarsus 2	Femur	Tibia	Tarsus 1	Tarsus 2
)	7·8	2·2	3·9	10·0	10·9	3·0	4·2
)–9·0	7·0–9·0	2·0–3·5	3·8–4·0	9·0–12·0	9·8–12·0	2·6–4·0	4·0–4·8
68	0·54	0·39	0·10	0·77	0·72	0·27	0·28

fawn areas approximately one segment in diameter surround them; a dark line on each side of anterior scent gland opening. Anus black (O. II, 2 *pn*); two segments immediately anterior to anus, blackened on mid-ventral edges.

Fourth nymphal instar (fig. 3 and Table II)

Head : more than one-third again as broad as long, 10·6 : 6·9 ; eyes almost one-third as wide as interocular space, 2·0 : 6·5 ; eye length approximately three-fourths anteocular length, 2·7 : 3·9 and approximately one-third length of head, 2·7 : 6·9. Rostrum extending to posterior coxae, and resting, partially, in a very shallow groove on ventral surface of head and thorax ; the first segment a little over two-thirds length of head, 4·8 : 6·9 ; total length almost half length of body, 15·8 : 32·5 ; segments one to four 4·8 : 4·0 : 3·0 : 4·0. Antennae almost one and a half times as long as width of head, 14·5 : 10·6 ; less than half length of body, 14·5 : 32·5 ; segments one to four 2·7 : 3·5 : 3·0 : 5·3.

Thorax : pronotum broader than long ; broader posteriorly than anteriorly ; sides arcuate, rounded posteriorly ; posterior edge may be slightly sinuate or straight ; slightly convex. Mesonotum at middle, four-fifths length of pronotum, 3·8 ; 4·8 ; posterior margin between hemelytral

pads at middle, arcuate. Length of mesonotum laterally to tip of mesonotal wing pad, one half as long again as mesonotum at middle, 6·0 : 3·8. Wing pad development considerably advanced on third stage ; mesonotal pads overlap metanotal pads except at inner bases and sides ; extending usually one-third to one half length of first abdominal segment. Metanotum very short at middle, black pigmentation extended over wing pads but absent at middle.

Abdomen : slightly shorter than head and thorax together, 16·0 : 16·4 ; almost one and three-fourths times width of head, 17·4 : 10·6. Scent gland openings and pleura as in earlier stages. Eight abdominal segments.

Size (in mm.) *:* mean length 2·05 ; mean width (head) 0·67 ; (abdomen) 1·10.

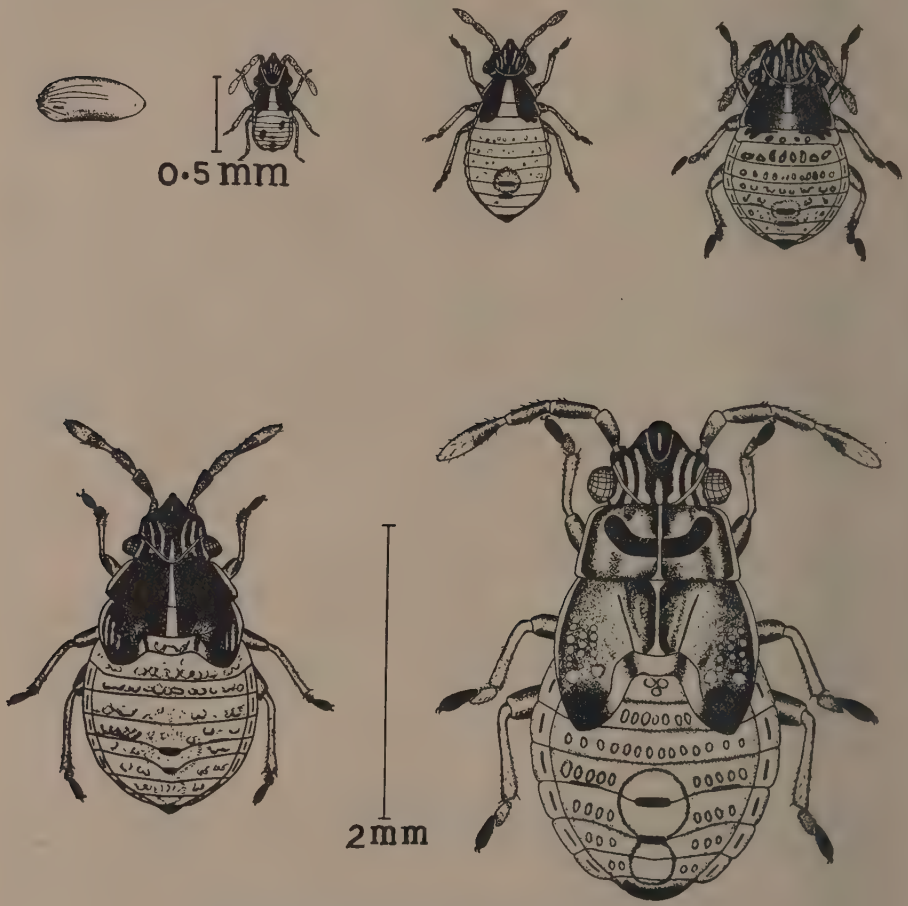


Fig. 3.—*Nysius huttoni* : egg and nymphal instars.

Colour : Head : black (O. II, 2 *pn*) ; seven head stripes and ecdysial suture of head, pale orange to yellow (O. VI, 3*ic*) ; eyes brownish-red (O. VIII, 6 *pg*) ; antennae black, white bands at joints, distal half of fourth segment brown. Rostrum orange-brown (O. X, 4 *pc*), fourth segment black. *Thorax* : except for mid-dorsal strip and portion of metanotum between wing pads, black (O. II, 2 *pn*) ; dark band across centre of pronotum densely black (O. series O, *p*) ; narrow, pale orange (O. VI, 3 *ic*) mid-dorsal strip on thorax ; two or three similar coloured lengthwise strips on mesonotal wing pads, and one on each metanotal wing pad ; pleura pale grey, almost transparent (O. series O, *e*) ; legs dark brown. *Abdomen :* mainly a dirty orange (O. X, 3 *nc*) ; red (O. XII, 7 *pc*) markings;

many have extended laterally to enclose parts of the whitish or pale grey background colour, resulting in a row of white spots with red borders; such markings confined to posterior half of each segment. Dorsal abdominal scent gland openings black; a dark line on each side of anterior opening (as in third and fifth instars). A circular area, reddish throughout, radiates from anterior scent gland opening to middle of third segment anteriorly, and anterior of sixth segment posteriorly; a smaller brown-edged circular area extends from posterior scent gland opening to anus. Pleura flattened, each segment marked by one red (O. XII, 7 *pc*) bar dorsally, and two parallel red bars ventrally. Ventral abdominal surface now marked similar to dorsal surface, but sometimes the red markings are orientated lengthwise across, and not along, the segments; anus black; segments six to eight black on ventral edges.

Fifth nymphal instar (fig. 3 and Table II)

Head: half again as broad as long, 12·4 : 8·3; eyes a little more than one-fourth as wide as interocular space, 2·2 : 7·9; length of eye almost three-fourths anteocular length, 3·1 : 4·5, and more than one-third length of head, 3·1 : 8·3. Rostrum extending to posterior coxae, and resting, partially in a shallow groove on ventral surface of head and thorax; the first segment three-fourths length of head, 6·0 : 8·3; total length half length of body, 20 : 40; segments one to four 6·0 : 5·3 : 4·1 : 4·7. Antennae one and a half times as long as width of head, 19·4 : 13·0; a little less than half length of body, 19·4 : 40·0; segments one to four 3·8 : 5·1 : 4·0 : 6·5.

Thorax: pronotum more than twice as broad at posterior as long, 15·7 : 7·0; sides straight, rounded anteriorly and flaring posteriorly to humeral angles; posterior edge may be sinuate or straight; slightly convex. Mesonotum at middle a little shorter than pronotum, 6·5 : 7·0; posterior margin between hemelytral pads at middle, arcuate. Length of mesonotum laterally to tip of mesonotal wing pad, twice as long as mesonotum at middle, 13·3 : 6·5. Mesonotal pads overlay metanotal pads, except at inner bases and sides, so that tips of both are level and extend, usually, to posterior of second or third abdominal segment. Metanotum at middle short, one fifth as long as mesonotum at middle, 1·3 : 6·5. Legs: forefemora shorter than midfemora, midfemora shorter than hindfemora, 7·4 : 7·9 : 10·0; foretibiae shorter than midtibiae, midtibiae shorter than hindtibiae, 7·7 : 7·8 : 10·9; tarsi two-jointed, second segment longer than first; foretarsus one shorter than midtarsus one, midtarsus one shorter than hindtarsus one, 2·0 : 2·2 : 3·0; foretarsus two longer than midtarsus two, but shorter than hindtarsus two, 4·0 : 3·9 : 4·2.

Abdomen: approximately three-fourths length of head and thorax together, 16·9 : 23·1; one and a half times width of head, 19·7 : 12·4. Two mid-dorsal abdominal scent gland openings intersegmentally disposed between segments four and five, and five and six; a dark line occurs laterally on each side of anterior scent gland. Pleura narrow, flattened, opaque. Eight abdominal segments, the eighth tergum platelike, projecting slightly beyond anus. *Ventral abdomen (male):* sternites seven and eight darkened on mid-ventral line; external genitalia not evident. *Ventral abdomen (female):* sternites six, seven and eight darkened on mid-ventral region, sternite six sometimes darkened on one border only; external genital rudiments evident as more heavily pigmented area on mid-ventral line of segments seven and eight.

Size (in mm.): mean length 2·52; mean width (head) 0·78; (abdomen) 1·24.

Colour: Head: black (O. II, 2 *pn*), seven dorsal head stripes and ecdysial suture of head pale orange to pale grey (O. II, 1 *ca*); eyes reddish-brown (O. IV, 6 *pl*); ventral surface of head dark brown to black except for white bases of antennae and a light grey (O. series 0, *e*) area under eyes; antennae dark brown almost black, white bands at joints of segments, distal half of fourth segment lighter brown. Rostrum dark brown almost black, fourth segment black. *Thorax:* black (O. II, 2 *pn*), not a deep black but denser on tips of wing pads; dark band across centre of pronotum densely black (O. series 0, *p*); in places lighter pinkish to pale grey (O. II, 1 *ca*) markings on wing pads; narrow mid-dorsal, thoracic ecdysial suture line, white to pale grey (O. II, 1 *ca*)—this strip, wider in earlier instars, is here reduced to a line; pleura pale grey (O. II, 1 *ca*). Legs: coxae and subcoxal plates black (O. II, 2 *pa*); trochanters dark brown; femora dark brown, tibiae lighter brown, proximal tarsal segment dark brown, distal tarsal segment black. *Abdomen:* to naked eye appears grey-brown but on closer examination appears mainly red; background colour of dorsal segments greyish-blue (O. II, 14 *ge*); white spots in a row across each segment, each spot surrounded by a red (O. XII, 7 *pc*) border; abdominal scent gland openings black (O. II, 2 *pn*); a dark line on each side of anterior scent gland; a dark edged circular area lighter in interior, encircles anterior scent gland opening and extends from segment four to segment six; a similar coloured but smaller circular area extends from posterior scent gland opening to terminal segment; eighth tergite black (O. II, 2 *pn*); pleura flattened, white to grey (O. II, 1 *ca*), each

segment marked by one red (O. XII, 7 *pc*) bar dorsally and two parallel red bars ventrally. Ventral surface of abdomen similar in colour to dorsal surface except that background more of a bluish or greenish tinge, and white spots and red markings not as regular. Mid-ventral markings on segments six to eight in females, and seven and eight in males, dark brown to black.

From the foregoing descriptions it is seen that each nymphal instar is readily distinguished by size, by characteristic black pigmentation on the metanotum in the first three instars, and by wing pad development in the fourth and fifth instars.

III. Variation within the Species

(1) *Immature stages*

(a) *Egg dimensions*

A total of 176 eggs were measured under a Zeiss low power stereoscopic microscope, using an eyepiece scale (one scale division = 0·063 mm.). Because of the shape

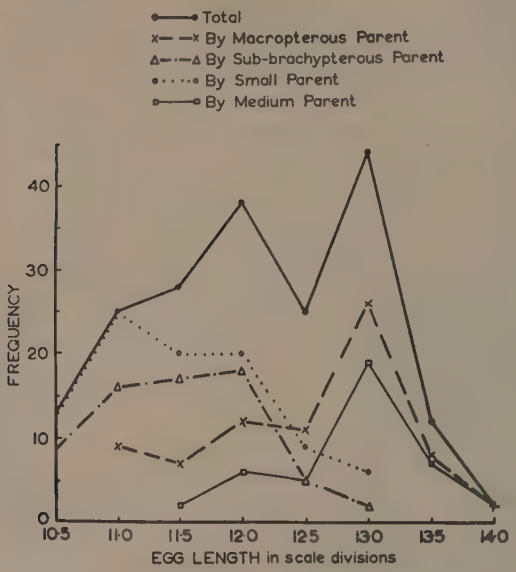


Fig. 4.—*Nysius huttoni*: distribution of egg length.
(Measurements are in eye-piece scale divisions: one scale division = 0·063 mm.)

of the egg, it was necessary to take three measurements of length and width on each. Most of the eggs were measured either on the day of oviposition or the following day, but it was found that even after one week there was no change in egg dimensions.

Length.—The mean length, 0·77 mm., was obtained by averaging the means of the three measurements taken on individual eggs. The distribution of egg length is shown in figure 4.

The total distribution was not normal. As macropterous and sub-brachypterous, and medium sized and smaller individuals were present among the females which laid the eggs, this then prompted two reclassifications of the data into (i) wing-form, and (ii) body size, of the maternal parents.

(i) *Individuals differing in wing-form.*—The eggs laid by the sub-brachypterous females seemed, in the main, to be smaller than those laid by macropterous females, but the latter's eggs still showed a bimodal distribution which overlapped the sub-brachypterous distribution. The means of these (so called) two groups differed

by one scale division, or 0·063 mm. The mean length of eggs laid by the sub-brachypterous females was (in scale divisions), 11·5 ± 0·75, whereas the corresponding figure for eggs laid by the macropterous females was 12·5 ± 0·63. However, this arbitrary division into two groups differing in wing-form is unsatisfactory because of the overlap, and does not explain the bimodality.

(ii) *Individuals differing in size.*—The eggs laid by the smaller females fell into a separate group from those laid by the medium sized females. There was less overlap, and a more marked modal peak for each population. The means of the two groups differed by 1·4 scale divisions, or 0·088 mm. The mean egg length (in scale divisions) of the smaller and medium sized females was, respectively, 11·4 ± 0·67, and 12·8 ± 0·60. The division into two groups according to size of adults compared with the division into two groups according to wing-form, gave a greater difference between the group means, a lesser difference between their standard deviations, and a better explanation of the bimodal graph for total eggs.

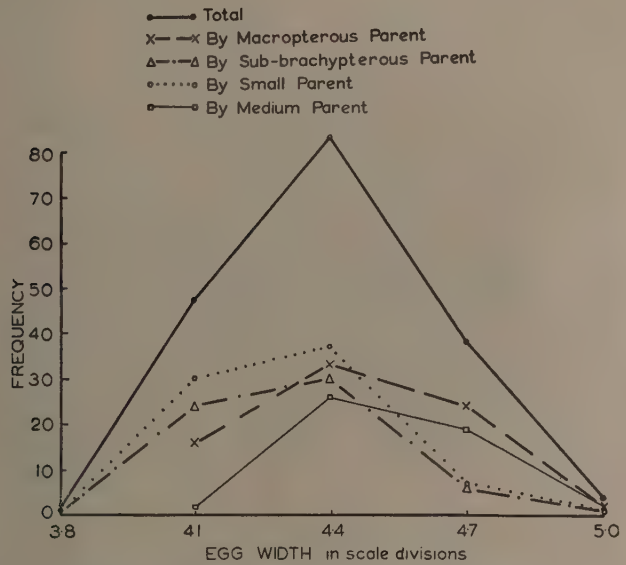


Fig. 5.—*Nysius huttoni :* distributions of egg width.
(Measurements are in eye-piece scale divisions : one scale division = 0·063 mm.)

Width.—The mean egg width, 0·28 mm., was obtained by averaging the means of the three measurements taken on individual eggs. The data on egg width (*see* fig. 5) received the same treatment as that on egg length. The total distribution was normal, and the mode of all five graphs was the same, but the graphs for eggs laid by the smaller and medium sized females tended to separate out, thus supporting the more noticeable difference shown in egg length. Because of the small width of an egg (mean 0·28 mm.) and the small total range (3·5–5·0 scale divisions) it is considered that the difference shown, which seems slight, has some importance.

(b) *Progression in Growth*

Dyar (as mentioned by Usinger, 1942) suggested that the sclerotized parts of the insect body increase in size in a more or less regular geometrical progression during successive instars, there being a growth factor for each species representing the

increase in size at each moult. Przibram (Przibram and Megusar, 1912) has extended this principle and gives a theoretical progression factor of 1·26 (the cube root of 2) for insects in general.

Head widths of 100 nymphs of each instar were measured, and the frequency distributions are shown in figure 6. The five instars were shown to be distinct, but there was some overlapping of the third and fourth, and fourth and fifth instars. There was more spread in the fourth instar and still greater spread in the fifth instar which exhibited a trimodal curve. A sex difference was expected because in the adults males are smaller than females, but clearly more than a sex difference is represented. For *N. coenosulus*, a bimodal distribution in the fifth nymphal instar was demonstrated by Usinger (1942). Although he could not distinguish their sex, he attributed the double peak to a sex difference. The author was able to distinguish the sex of fifth stage *N. huttoni* nymphs and considers that the trimodal curve may indicate three size groups.

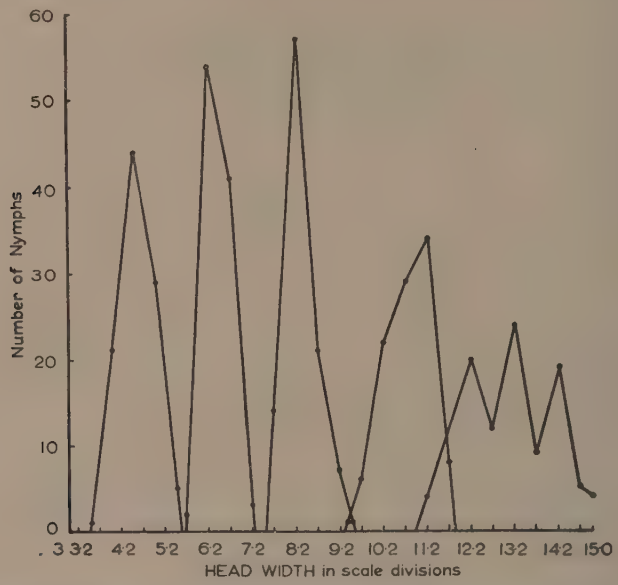


Fig. 6.—*Nysius huttoni*: distribution of head width showing the five nymphal instars. (Measurements are in eye-piece scale divisions: one scale division = 0·063 mm.)

At this stage it was necessary to determine whether or not a sex difference was involved. For the fifth nymphal instar description, body measurements were taken on nine males and eight females. There were slight size differences between the sexes in most characters. To elucidate this, analyses of variance were applied to four main characters, *viz.* head width, length of mesonotum at middle, width of mesonotum and width of pronotum. In the first three characters no significant differences between the sexes could be demonstrated. For width of pronotum there was a difference between the sexes, significant at the 5 per cent. level. The trimodal graph (which was drawn on head width data) is clearly not influenced by a sex difference and is regarded as representing three size groups.

By dividing the mean head width for each instar by that of the previous instar, the growth ratio between any two successive instars was obtained. The calculation of the mean growth ratio for *N. huttoni* is shown in Table III. Usinger (1942),

TABLE III.—*Calculation of mean growth ratio for* Nysius huttoni

(One scale division = 0·063 mm.)

Instars	Mean head widths (in scale divisions)	Growth ratio
2nd / 1st	6·3 / 4·5	1·40
3rd / 2nd	8·2 / 6·3	1·30
4th / 3rd	10·7 / 8·2	1·30
5th / 4th	13·1 / 10·7	1·22
Mean growth ratio for nymphal stages		1·31
Adult ♂ / 5th ♂	13·3 / 12·1	1·10
Adult / 5th		1·11
Adult ♀ / 5th ♀	14·0 / 12·6	1·11
Overall mean growth ratio from first instar to adult		1·266

working on *N. coenosulus* nymphs, obtained a mean growth ratio of 1·38 which is near Przibram's theoretical progression factor of 1·26. With *N. huttoni* the mean growth ratio for the nymphal stages was 1·30. Head width measurements of 50 adult males and 50 adult females were used in calculating the growth ratio between the fifth stage and the adult. The ratios obtained, 1·10 and 1·11, were also in reasonable agreement with Przibram's factor and showed that there was the same relative increase in growth in males and females. The overall mean growth ratio, from first instar to adult, came to 1·266 correct to three decimal places, and this almost equals Przibram's factor.

(2) *Adults*

(a) *Effect of Temperature on Wing Form*

Wigglesworth (1952) showed, with nymphs of *Rhodnius prolixus* Stål, that a high temperature (34° C.) in the fourth stage produced larger than normal wing pads in the fifth stage, whereas a low temperature (18° C.) produced smaller than normal wing pads. He showed that the optimum temperature for nymphal development was 28–30° C.

Accordingly, fourth stage nymphs of *N. huttoni* were subjected to one of three temperature ranges, to test the possibility that high temperature favoured macroptery, and low temperature, brachyptery. The temperatures chosen were: high, 34° C., in a controlled temperature cabinet; low, minimum 9·4–15·6° C., maximum 17–21° C., under a Dutch barn in December; normal, minimum 6·7–13·9° C., maximum 27·8–34·4° C., in a greenhouse. The nymphs were kept in glass tubes (6 in. × 1 in.), covered at one end by butter muslin and stoppered at the other with cotton wool plugs. A sprig of twin cress (*Coronopus didymus* (L.) Sm.) was replaced daily for food. In the high temperature group, relative humidity was maintained by the presence of a bowl of water in the temperature cabinet. Five nymphs were placed in each tube. The results are summarized in Table IV.

TABLE IV.—*Effect of temperature on wing form of adults reared from fourth to fifth stage nymphs*

	High temperature 34° C.	Normal temperature 6·7–34·4° C. 1	Normal temperature 6·7–34·4° C. 2*	Low temperature 9·4–21° C.
Number of insects reared through to adults	23	19	90	9
Macropterous	8·7%	10·5%	17·8%	.
Sub-brachypterous	91·3%	73·7%	67·8%	44·4%
Brachypterous	.	15·8%	14·4%	55·6%

* These insects were reared from eggs over a complete breeding season (September–March 1957–8) and hence were kept separate from the remainder which were reared from fourth and fifth stage nymphs.

It is clear that the sub-brachypterous form was the most common at normal temperatures, and this was so in both sexes. This form was also the most common in field samples. Of the macropterous form there were twice as many males as females, but of the brachypterous form there were twice as many females as males.

High temperature did not favour macroptery (as the sub-brachypterous form was still the most common) but tended to suppress it, and also suppressed the brachypterous form. In *N. huttoni* moulting was not retarded at high temperatures (34–42° C.) as it is in nymphs of *R. prolixus* (Wigglesworth, 1952), but rather hastened.

Subjection to low temperatures caused some increase in the brachypterous form, but suppressed the macropterous form. However, the number of insects used in this case was rather small.

When it was discovered that there were three size groups in *N. huttoni*, all the insects included in this experiment were examined and found to belong to groups II and III. Therefore, the above results and conclusions apply to these two groups, and may not necessarily apply to group I. Temperature is probably not a major factor in the determination of wing form in this species.

(b) *Crossing of Forms*

Crossing was necessary to determine whether or not the three wing-forms were merely different forms of one and the same species. The forms intercopulated freely. Later examination of field specimens, preserved *in copula*, showed that intercopulation occurred in all (*i.e.* nine) combinations.

Eleven experimental matings were made. The 22 insects had each been kept separate as fifth stage nymphs. Five sub-brachypterous females were mated with macropterous males, one brachypterous female was mated with a macropterous male, and five macropterous females were mated with sub-brachypterous males.

All eleven matings were successful, for eggs were laid, which later hatched, and the progeny also mated and bred. All three wing-forms were produced, but there was a majority of the sub-brachypterous form, thus: macropterous 17 per cent., sub-brachypterous 70 per cent., brachypterous 13 per cent. These percentages approximate the normal occurrence of forms in the species, as shown in Table IV. There was no noticeable reduction in fertility (hatchability) in comparison with a normal breeding experiment in which pairing was random.

When it was discovered that there were three size groups in *N. huttoni* (*see* (*c*) variation in size) the insects used in the above experiment were examined and found to fall mainly within group II. Three were of group III, and one was of group I.

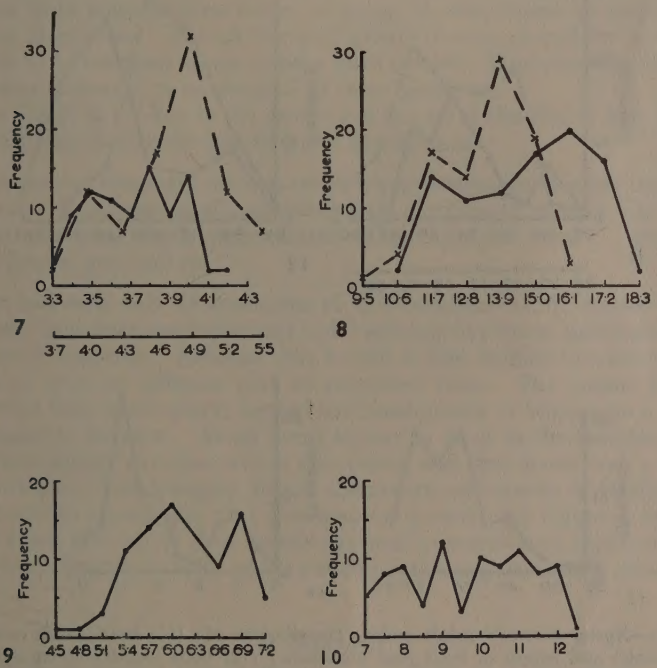
The experiment clearly demonstrated that the three wing-forms are members of one and the same species. There are a few Hawaiian Orsilline species which have relatively short wings, but in almost every case one form only occurs (Usinger, 1942).

The appearance of even two forms in the one species is very rare amongst the Orsillini ; there are about two cases in the Hawaiian species (*Nysius terrestris* Usinger, 1942, and *Nysius longicollis* Blackburn), but in both it is a sex difference, there being a somewhat shorter wing in the female. Therefore *N. huttoni* appears to be unique amongst the Orsillini in occurring in three wing-forms in both sexes.

(c) *Variation in Size*

The *N. huttoni* specimens examined differed in size, and there seemed to be three size groups. It was now clear that if any divisions were to be made, they would be on size and not wing-form.

Body measurements were taken on 164 specimens, including both sexes, from the following localities : Kaimai, Taumarunui, Horotiu, Westshore, Havelock North, Maraekakaho, Marton, Foxton, Waitarere, Hokowhitu, Massey Agricultural College,



FIGS. 7–10.—*Nysius huttoni :* Adult females. Distribution of: (7) head width (solid line and upper scale) and length of head plus pronotum ; (8) body length to wing tip (solid line) and body length to posterior of abdomen ; (9) width across hemelytra ; (10) wing length. (All measurements are in micrometer units : one micrometer unit = 0·24 mm.)

Blenheim, Nelson, Tuamarino, Seddon and Leefield. Six characteristics were measured, namely :

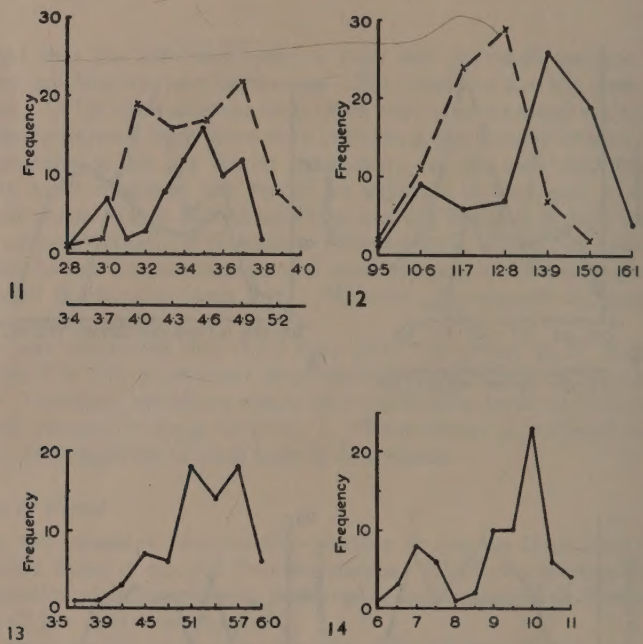
head width (including eyes)	*body length* (to posterior of abdomen)
total wing length	*width across hemelytra*
body length (to wing tip)	*length of head plus pronotum*

The two measurements of body length were taken to counteract the tendency for sub-brachypterous forms to fall into a smaller size group for this character. The

results are shown graphically in figures 7–10 for females, and in figures 11–14 for males. All measurements are in micrometer units : one micrometer unit = 0·24 mm.

A trimodal graph was obtained for head width and wing length in both females and males, and for width across the hemelytra in males. Six of the remaining graphs showed bimodal distributions, *i.e.* for body length (to wing tip) and length of head plus pronotum in both sexes, and for width across hemelytra and body length (to posterior of abdomen) in females. The distribution of this latter measurement in males was monomodal.

On all characters, except the one in males mentioned above, a group of small sized individuals (group III) was shown to be distinct. The fact that half of the graphs are merely bimodal may be interpreted as showing that there was no clear distinction between groups I and II. However, closer study should be made of



FIGS. 11–14.—*Nysius huttoni :* Adult males. Distribution of: (11) head width (solid line and upper scale) and length of head plus pronotum ; (12) body length to wing tip (solid line) and body length to posterior of abdomen ; (13) width across hemelytra ; (14) wing length. (All measurements are in micrometer units : one micrometer unit = 0·24 mm.)

figures 8 and 9. In the graph of body length (to wing tip) in females, group III was shown to be distinct, but the second peak showed greater spread and an overlapping of groups I and II. On the other hand, in the graph of width across hemelytra in females, group I was shown to be distinct, but the first peak showed greater spread and an overlapping of groups II and III. These two graphs combined, therefore, point to three size groups. This conclusion is supported by figure 13, a trimodal graph for width across the hemelytra in males. Therefore in the summation of all the graphs the balance was moved to over half, *i.e.* 7 out of 12 (4 characters out of 6) showed three distinct size groups.

The above conclusion is further supported by the trimodality of head width in

adults and fifth stage nymphs, and by the bimodality of egg length. What status should be assigned to these size groups has yet to be tested by interbreeding.

IV. Validity of *Brachynysius*

Sub-brachypterous forms of *N. huttoni* seemed similar to the *B. convexus* description. Using the *N. huttoni* redescription (which was made on group I individuals) it is seen that the two species are similar (except for the wings). In both species antennal proportions are similar, the ratio width of scutellum to length of scutellum is similar, the length of the first rostral segment is similar, the bucculae are similar, and the antennae are as long as head, pronotum and scutellum together. Of the *Brachynysius* head, Usinger (1943) said " Head as in typical *Nysius* . . . "

Thus the proportions of the group I *N. huttoni* individuals are very similar to those of *B. convexus*, although actual measurements are slightly larger. In all three *N. huttoni* groups the proportions are similar. Sub-brachypterous forms (which were reared from macropterous forms) of group II were found to conform to the *B. convexus* description. But all forms of group II were proved by interbreeding experiments to be members of one and the same species. Examination of a paratype of *B. convexus* showed it to be identical to these specimens.

Usinger (1943) in a " key to the genera and species of Orsillini in New Zealand ", gave the following condensed description of *Brachynysius* :

> " Hemelytra distinctly convex, costal margins strongly rounded beyond basal fourth. Membrane small, exceeding level of apices of coria by less than one-fourth the total length of membrane, without apparent veins . . . *Brachynysius convexus* n. gen. and sp. "

Usinger had seen only 14 specimens of this complex—11 *N. huttoni* specimens (which would have been macropterous) and 3 sub-brachypterous specimens which he described as *B. convexus*. It seems that he had in fact studied two extremes of *N. huttoni* which were so different that he separated them. The author found that extremes went from macroptery, beyond sub-brachyptery to brachyptery, and there were all grades in between. As all forms appear to occur in the localities sampled, this represents simply variation within the species, and thus is not even a cline.

It follows then, that Usinger's key to the genera and species of Orsillini in New Zealand should be amended so that *Brachynysius* is sunk, and *Nysius* is extended to include all forms (this would then include the brachypterous form here first recorded, and the sub-brachypterous form which was formerly designated as *B. convexus*).

V. Summary

The imago of *Nysius huttoni* White is redescribed, the immature stages are described, and all stages are illustrated for the first time.

The variation exhibited in wing-form and body size is discussed, and appears to be unique amongst the Orsillini.

Brachynysius convexus Usinger is shown to be identical to the sub-brachypterous form of *N. huttoni*.

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